

THE STUDY AREA

A. Location and General Characteristics of River, Watershed and Region

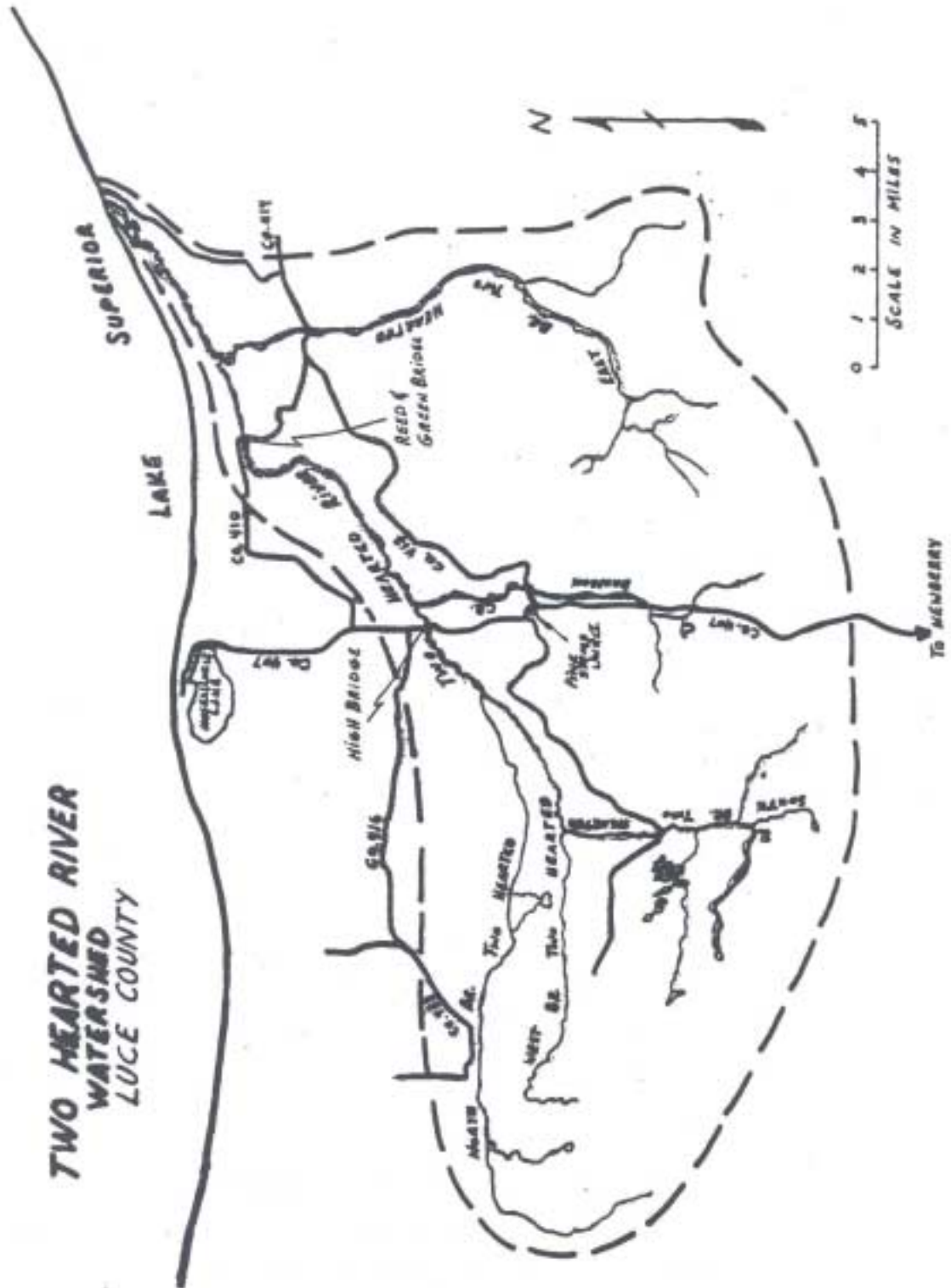
The Two Hearted River is located in northern Luce County in the eastern third of the Upper Peninsula of Michigan. The 35-mile long mainstream flows from the northwest portion of the county in a northeasterly direction to Lake Superior. It has five major tributaries: the East, South, West and North branches, and Dawson Creek. The mainstream itself starts at the confluence of the South Branch and West Branch.

The history of the area is closely associated with logging. Logging companies came into the area in the late nineteenth century to cut the virgin white pine. After the pine was removed, fires and hard times caused many owners to allow their land to revert to the state for nonpayment of taxes. Presently the state forests and much of the private lands are being managed for forest products, fish and wildlife, water conservation, and recreation.

The Two Hearted drainage basin is located almost entirely within the boundaries of Lake Superior State Forest (176,000 acres of state-owned land). However, there are substantial holdings of private land within the state forest. A large section of the East Branch is outside the state forest and is in private holdings. The drainage area of the river system is approximately 115,000 acres.

The region is thinly populated as evidenced by the 1970 Luce County population of 6,693 persons. Little growth is expected in the immediate future. Newberry, with a population of near 2,600, is about 20 miles south of the center of the Two Hearted River system. The only other cluster of population near the Two Hearted is the Manistique Lakes-Engadine-Naubinway string of settlements, which has a population of about 2,500. Thus, population pressure on the river area from local residents is small.

Residents are primarily dependent upon tourism, forestry, trade and services, and government for their livelihood. Agriculture has declined rapidly since 1930. Given the remoteness of the area, the existing low base for service-related activities, the thin nature of forestry for economic development, and the exodus of industries from the region in the last decade, economic expansion is not expected to result in land development pressure in the Two Hearted River system. However, the desire on the part of urban dwellers to own a northern retreat will cause increasing speculation in land and subsequent development pressure. This can rapidly result in "suburbanization" of wild lands.



B. Physiography

The Two Hearted River Valley lies in the eastern or lowland-plains division of the Upper Peninsula. The present surface relief has resulted from glacial deposition on an old eroded lowland. The features which are peculiarly of glacial origin include a number of plains and terraces lying at successive levels representing stages in the level of glacial lakes. A few small isolated hilly areas of morainic deposition stood above the highest lake stage, the Algonquin.

Lakes are widely distributed throughout the Two Hearted River Watershed and constitute features of scenic interest and recreational value.

Swamp land occurs in large continuous bodies such as found in the valley of the North Branch and is also widely distributed throughout the area in small valleys and old lakebeds. Wet or poorly drained land is for the most part forested but also consists of open marsh and bog. Relief of any magnitude in the watershed is lacking with highest elevations only about 200 feet above Lake Superior.

C. Stream Characteristics

1. Water Quality

The Michigan Water Resources Commission has established Intrastate Water Quality Standards and Use Designation* for the Two Hearted River. It is to be protected for recreational total body contact (i.e., swimming), coldwater fish species, and other uses. Where water is to be protected for more than one use, the most restrictive individual standards of designated water use will apply. Also, if existing water quality is superior to the designated standards, the water must be maintained at the higher level until it has been affirmatively demonstrated to the Michigan Water Resources Commission that the change in quality will not become injurious to the public health, safety or welfare, or become injurious to any uses being made of the waters. Presently there are no known wastewater discharges into the Two Hearted River system. The high quality of the water reflects relatively undisturbed natural conditions.

2. Stream Flow Characteristics:

The Two Hearted River Basin encompasses a drainage area of 180 square miles. Overall flow data is not available for this river system, however, the U.S. Geological Survey has made several miscellaneous flow readings. They show the base flow of the mainstream at Reed and Green Bridge to be 75 cubic feet per second in August 1963. A reading taken in late October of 1967 showed the flow to be 150 cubic feet per second at the High Bridge. These measurements indicate that the stream has sufficient flow during low stage to permit canoe use. Base flow on the East Branch at Shamrock Bridge was measured at 31 cubic feet per second and at the lower end of the stream at 58 cubic feet per second.

*Use Designation Areas for Michigan's Intrastate Water Quality Standards, Michigan Water Resources Commission, Department of Natural Resources, March, 1969.

Although not a large river, reports indicate that the Two Hearted has risen over five feet during spring flood periods and occasionally nearly overflows Reed and Green Bridge. The sandy soils and forest cover prevent rapid runoff and thus, more serious flooding. Generally, the Two Hearted River would be considered as having a very stable base flow during the summer months which is important to trout populations and canoeists using the river.

3. Stream Bed Characteristics

The South Branch of the Two Hearted River is a clear spring fed stream flowing from an area of mixed northern hardwoods through open beaver meadows with tag alder fringes to Hemlock Dam. From Hemlock Dam to its confluence with the West Branch the stream flows through marginal cedar and spruce swamp and northern hardwoods.

Hemlock Dam was a water control structure used prior to 1915 for log drives but is no longer usable and only some of the original timbers remain. The stream bottom is stable sand and the river has much natural debris providing excellent fish cover.

The West Branch heads in terrain of rolling Strongs Sandy Loam hills covered with northern hardwood and hemlock, and meanders north and then eastward through a spruce and tag alder valley of Kersten Muck. Much of this portion of the river has been intermittently flooded with beaver dams. The Spile Dam, about ½ mile upstream from its confluence with the South Branch, was once a logging water control structure. This stream of clear water has a moderate flow over sandy bottom and much natural debris for cover. There is considerable eelgrass in the bed which would lead one to believe that the water is warmer than the South Branch.

The mainstream from the confluent of the South Branch meanders through an area of sandy loam and loamy sand and is bordered by tag alder, spruce, balsam, white pine, and hardwood. The bottom is mostly sand. There are considerable number of pools four to six feet deep. At Hunter's Dam (an old water control structure) the stream gradient becomes steeper and flows over a series of sandstone ledges to the confluence of the North Branch.

The North Branch also heads in a terrain of rolling hills of Strongs Sandy Loam covered with northern hardwoods and hemlock. The stream is clear at the headwaters, but it passes through fields of Carbondale and Kersten Muck vegetated with black spruce, balsam, and tamarack and becomes light brown in color. The stream has a tendency to "spread" in the swamps between Stillwagen and LaDuc Lake. This stream becomes a mere trickle in dry years by the time it reaches the mainstream. Because of inaccessibility, thick cover, and much natural debris in the river, this stream is very difficult to fish.

The mainstream from the North Branch to Dawson Creek, starts in a series of moderately deep pools and builds up momentum over a series of shallow sandstone ledges with intermittent deep pockets. The river is very rapid for a half-mile west and a quarter mile east of the High Bridge area. The riverbanks are high and steep and the valley narrow along this series of rapids.

From Dawson Creek to the mouth of the East Branch it flows through a narrow valley between rolling hills of Rubicon Sand covered with stands of northern hardwood interspersed with hemlock balsam, and spruce. The immediate banks are fringed with alder, spruce, balsam, and cedar. There are numerous deep pools and the bottom is sandy. Cover consists of overhanging trees, undercut banks and logjams. This portion of the river can be fished from the bank, waded, or is easily canoeable. A canoe trail was cut through the logs and around immovable jams, however, this "trail" has since deteriorated.

From the East Branch to its mouth at Lake Superior the mainstream is about 4-60 feet wide and varies in depth from 1-7 feet. It flows with moderate current in a narrow valley. There are 16 short rapids below the mouth of the East Branch and another about two miles downstream. Otherwise the bottom is sandy with long deep holes, undercut banks, and large sandbars on the inside of bends. There is a considerable amount of natural debris in the channel, but the entire stretch of river is canoeable.

Dawson Creek flows from a vast flat area of Tahquamenon Peat and Carbondale Muck. The vegetative cover of the headwater is spruce bog interlaced with low ridges of balsam spruce, jack red and white pine. Little Dawson, a brown stained slow-moving creek, flows in from the southwest; Whiskey Creek, which is clear, flows in from the west. From the Little Dawson on down the terrain is rolling Rubicon Sand. From Whiskey Creek downstream the river valley narrows and the rate of flow increases over a gravel and sandstone bottom.

The main tributary to the Two Hearted River is the East Branch which flows out of the Sleeper Lake Marshes and drains the Chesbrough Lake Highlands. The marshes are underlain by Tahquamenon and Spalding Peat and Newton Sand. As the stream emerges from the Sleeper Lake marshland, the bed is laden with natural debris and overhanging alder. As the stream leaves the marshland it becomes continued in a steep narrow valley. The upland from Potter's Camp downstream is Rubicon Sand covered with tag alder, spruce, and balsam. The stream bottom is sand with deep holes on the bends. There is an outcropping of gravel and hard pan for a mile upstream and a half-mile downstream of the old Shamrock Bridge. From the Shamrock rapids to the mainstream the banks are steep and sandy and the bottom varies from sandy bottom shallows to deep holes on the bends. Because of the windfalls and logjams, this river is not considered canoeable, but, for the most part is wadeable. It is only moderately productive for fish.

<u>Stream</u>	<u>Total Linear Miles of Stream</u>
Mainstream	34.5
North Branch	28.5
West Branch	9.0
South Branch	7.0
Dawson Creek	7.0
East Branch	21.7
Jack Creek	<u>6.0</u>
	113.7

D. Structures for Natural Resources Management

There are few man-made structures for natural resources management in the study area. However, some stream improvement has been carried out on the East Branch and mainstream. During the days of the CCC program, portions of the East Branch and the mainstream below Reed and Green Bridge were improved with log deflectors and stream bank cover. Most of this work is not visible today. The exposed sand banks on the East Branch from County Road 412 downstream were riprapped with brush and planted with jack pine to prevent erosion during high-water periods. Another 206 stream improvement structures to improve trout habitat were installed in 1946 on the East Branch by the Michigan Department of Conservation's Lake and Stream Improvement Section.

An electric lamprey weir has been constructed on the mainstream near the mouth. The U.S. Fish and Wildlife Service has maintained this weir since 1955. The weir operates from early April to early July of each year to help monitor abundance of lamprey in eastern Lake Superior.

E. Soils

Soils of the study area vary widely in texture, structure, thickness, chemical composition, and moisture and consequently in fertility and productivity. The variable character and the number of distinct soils are attributed to the great variety of rock material in the glacial deposits which underlie or comprise the soils.

1. Mineral Soils

The more common mineral soils in the study area include Rubicund, Grayling, Newton, Strong's, AuTrain, Saugatuck and Brimley. The mineral soils for the most part are naturally fairly well drained as the movement of the water through the soil is free, and the slope is sufficient to provide free runoff. In more than 50 percent of the area the soils become excessively dry at times during the summer, but it is estimated that 40 percent of the land is characterized either by a high water table or by a permanently swampy condition.

2. Organic Soils

Organic soils are composed predominately of plant matter and in this respect constitute a distinct class, as compared with the more common mineral soils. In this area organic soils occur in forested swamps, open bogs, and marshes. The more common organic soils found in the study area include Greenwood, Spalding, Tahquamenon peats, and Carbondale and Houghton muck.

F. Vegetation

The Two Hearted River and its tributaries flow through a variety of forest cover types. No extensive settlements or farms have ever been established within the boundaries of the watershed. Major forest cover types in the study area include swamp conifers, northern hardwood, aspen, birch, jack pine, and red and white pine. A great deal of species variability occurs within the confines of each forest type as a result of admixtures of associate species.

The study area also offers many examples of the various stages of primary plant succession resulting principally from forest fires. The climax forest in all successional sequences is the northern hardwood forest.

At the headwaters and as the tributaries course through the conifer swamps, the river valley ecology is very similar to the surrounding terrain. After leaving the swamps and entering northern hardwood and pine forests, the valley deepens and the ecology of the river bottom differs significantly from the surrounding forest. The forest cover within the conifers of the river valley remains principally composed of lowland species such as cedar, spruce, tag alder, and elm.

Most of the open land, - cut over pine plains and burned areas - has been planted or is regenerating naturally. Twenty-three thousand acres have been planted to red, white and jack pines since 1928 in the Two Hearted River watershed. Considerable mechanical site improvement has also been done in recent years to facilitate natural regeneration.

G. Climate and Seasons

The study area lies between parallels 46° and 47° north latitude. Climate features include a mean annual temperature of about 40° Fahrenheit, a mean annual precipitation (including melted snow) of approximately 30 inches, an average snowfall of about 90 inches a year, high relative humidity, low percentage of possible sunshine, low wind movement, and low evaporation.

The winters are long and frequently extremely cold. The mean temperature is below freezing from November to March and a low of -38° has been recorded. Cool summers characterized by pleasant daytime temperatures are typical of the region with a seasonal average high from June through August of 74.1°F and an average low of 50.6°F.

Considerable precipitation is stored as snow during the winter. This storage results in heavy spring runoff. The largely forested watershed retards snow melt by shading. At the same time the deep snow prevents deep-freezing of the sandy soils. Generally then, snow melt in the forested areas has time to percolate into the soil and returns as ground water rather than surface run off which would contribute to greater spring floods.

H. Ownership and Status

Seventy percent of the watershed is within the Lake Superior State Forest. However, only 48 percent of the watershed (54,320 acres) is in public (state) ownership. The remaining 58,564 acres are in private ownership. The bulk of the private holdings, in all areas except the East Branch, belong to Cleveland Cliffs Iron Company. This corporation and its subsidiary, Superior Realities, own frontage along approximately 16 miles of river. The company has kept its lands open for public use. Three other "company type" landowners, Mead Corporation, Michigan Pole and Tie Company, and Kimberly-Clark own minor acreages on the watershed. Three major hunting clubs own 5,188 acres in the drainage area of the East Branch. The remaining private lands are scattered throughout the area in individual ownerships of relatively small size (40 acres and larger) and are mainly used for hunting and fishing camps.

The following table shows roughly the amount of public-private stream frontage and the numbers of individual owners:

Stream	Miles of Frontage State Ownership		Miles of Frontage Private Ownership		Number of Private Owners	Number of Development
Mainstream	19.50	(57%)	15.00	(43%)	27	18
East Branch	6.75	(32%)	15.00	(68%)	14	7
South Branch	2.25	(32%)	4.75	(68%)	7	7
West Branch	2.25	(25%)	6.75	(75%)	3	1
North Branch	16.50	(58%)	12.00	(42%)	4	4
Dawson Creek	2.50	(36%)	4.50	(64%)	11	9
Jack Creek			<u>6.00</u>	<u>(100%)</u>	<u>1</u>	<u>0</u>
Totals	<u>49.75</u>	<u>(44%)</u>	64.00	(56%)	67	46

I. Accessibility:

The Two Hearted River system is relatively inaccessible by improved road. Only two bridges cross the mainstream dividing its 35-mile length roughly into thirds. A blacktopped road (County 407) from Newberry north to Muskallonge Lake State Park crosses the upper section of the mainstream at High Bridge while the lower section is crossed by County Road 410 at Reed and Green Bridge. A footbridge crosses the mainstream at the forest campground near its mouth.

The mainstream, upstream from High Bridge, is paralleled by an unimproved county road for six miles. Downstream from Reed and Green Bridge it is paralleled for several miles along its north bank by an unimproved logging trail. These roads are little traveled and at times impassable.